Installation and Operation Manual

© Printed in England Edwards High Vacuum International is part of BOC Limited

INSTRUCTIONS
03-A371-01-882
JANUARY 1986
(Supersedes
03-A371-01-881)
I/D 32

E2M1.5 ROTARY VACUUM PUMP

Supplementary Instructions

EBV20 gas ballast valve	04-A500-06-882
Vibration isolators	04-A248-01-881
IT200 inlet trap	04-A441-01-881
FL20K foreline trap	04-A133-05-880
OMF2 oil mist filter	M04629
PV10EK solenoid operated isolation valve	08-C311-07-880

CONTENTS PAGE NUMBER

1. INTRODUCTION 4

2. GENERAL INFORMATION 4

2.1 Technical data 4
2.1.1 Electrical data 4
2.2 Construction 5
2.3 Gas ballasting 6
2.4 Interstage pumping port modification 6

3. VACUUM CONNEXIONS 8

3.1 Pump outlet connexion 8

4. OPERATING INFORMATION 10

4.1 Direction of rotation 10
4.2 Start up 10
4.3 Ultimate vacuum 10
4.4 Shut down 10

5. MAINTENANCE 11

5.1 Oil changing 12
5.1.1 Oil filling 12
5.2 Internal oil filter cleaning 13
5.3 Discharge valve renewal 13
5.4 Oil distributor valve renewal 13
5.5 Drive end oil seals renewal 14

6. PUMP AND SYSTEM PROTECTION 18

6.1 Removal of condensable vapours 18
6.2 Chemical aggressive vapours 18
6.3 Sodium azides 18
6.4 Ingress of dust 18
6.5 Hermetically sealed pump 19

7. ENVIROMENTAL PROTECTION 19

8. LUBRICANTS 19

8.1 Chemically resistant 19
8.2 Fomblin oils 19
8.3 Standard and low temperature 19

9. PRODUCT DESCRIPTION-SPARES-ACCESSORIES 21

9.1 Product description 21
9.2 Spares 21
9.3 Accessories 21

10. COMMUNICATION WITH EDWARDS 23

ILLUSTRATIONS

FIG.1 E2M1.5 installation data and dimensions 7
FIG.2 External connexions and fittings 9
FIG.3 Oil system (schematic) 12
FIG.4 Assembly of drive end oil seals 14
FIG.5 E2M1.5 rotary vacuum pump 16
FIG.6 Accessories 20

TABLES

TABLE 1 Maintenance schedule 11

LISTS

E2M1.5 spares parts list 17

1. INTRODUCTION

1.1 Installation

On receipt of the pump, remove all packing material, protective blanks and covers and inspect the unit for any damage incurred during transit. Contact Edwards High Vacuum immediately if any damage to the unit is found. When fitting the baseplate, ensure that the notched end is positioned under the oil box.

WARNING: RELEASE ALL TRANSIT BOLTS/BRACKETS BEFORE COMMISSIONING THE SYSTEM.

2. GENERAL INFORMATION

The E2M1.5 rotary vacuum pump is a two-stage, oil sealed, direct drive unit designed for a wide range of basic vacuum pumping duties. The pump is free standing and is directly driven via a coupling from a single-phase motor. The standard motor supplied is a fan cooled, totally enclosed machine to comply with IEC-IP44 safety enclosure requirements and incorporates a thermal overload protection with an automatic re-set (single phase).

2.1 Technical data

Displacement (swept volume)	50Hz	m^3h^{-1}	1.5
	60Hz	m^3h^{-1}	1.8
Speed (Pneurop)	50Hz	m^3h^{-1}	1.6
	60Hz	m^3h^{-1}	2.0
Ultimate vacuum (partial pressure)		mbar	5×10^{-4}
without gas ballast (total pressure)		mbar	1.5×10^{-3}
with gas ballast (partial pressure)		mbar	2.5×10^{-2}
Inlet connexion			KF10
Outlet connexion			Nozzle = 11mm external Ø
Maximum inlet pressure for water vapour		mbar	15
Maximum water vapour pumping rate		gh^{-1}	16
Oil capacity		litre	0.35
Recommended lubricating oil		Edwards	15 or 17
Pump operating temperature (normal)		°C	75
Weight		kg	10

2.1.1 Electrical data

The motors normally fitted to this pump are to IEC-IP44 safety enclosure requirements and are rated as follows:-

110/125V, single phase, 50/60Hz (0.16kW)
220/240V, single phase, 50/60Hz (0.16kW)

The single-phase motors incorporate a thermal overload protective device with automatic reset. Ensure that the mains voltage corresponds with the voltage specified on the motor data plate and the supply is used to 13A rating.

A flying lead is provided for connexion to the mains supply, this lead is colour coded:

BROWN = LIVE

BLUE = LIVE

YELLOW/GREEN = EARTH

2.2 Construction

The pumping mechanism is a slotted rotor/sliding vane type housed in a stator which incorporates high vacuum (HV) and low vacuum (LV) stages with an interconnecting port. An additional (optional) pumping port can also be incorporated to provide an interstage pumping facility at interstage pressure. The bore of the high grade cast iron stator provides an ample centre journal bearing for the overhung rotors. The complete pump cartridge is mounted on an adaptor at the drive end and is enclosed by an oil reservoir box.

A pressurised lubrication system (Fig.3) ensures a constant flow of oil to the pumping mechanism throughout the pumping speed range. The oil pump comprises a sliding vane operating in an eccentric housing and actuated via a coupling driven from the LV rotor. The oil is pumped from the oil box via a fine mesh strainer and is circulated via the spring-loaded distributor valve to the LV rotor end face and through the rotor to the interstage journal bearing where it is outgassed prior to lubricating the HV rotor end face. If the pump stops for any reason, the oil distributor valve will close to prevent further discharge of oil to the pump interior. Since the pumping chambers are air tight, this arrangement prevents both air and oil 'suck-back' unless the gas ballast valve is open. (For protection in these circumstances refer to the 'Gas ballasting' section). All shaft (dynamic) seals are fluoro-elastomer as standard, as are also the distributor and discharge valve seals. The pump cartridge is completely O-ring sealed and dowelled for ease of maintenance.

The level of oil in the oil box reservoir is indicated by a wide ranging sightglass. Oil filler and drain plugs are provided on the oil box.

External connexions comprise a flanged inlet adaptor, outlet nozzle and gas ballast control knob. An alternative location for the pump inlet is provided on the side of the adaptor as indicated in Fig.1. Pump mounting is by means of a detachable steel baseplate fitted with rubber pads or vibration isolators which are designed to absorb any vibration generated by the pump during operation. Details of vibration isolators can be found in the 'Accessories' section.

2.3 Gas ballasting

The E2M1.5 rotary vacuum pump incorporates a gas ballast facility to enable it to pump most condensable vapours directly without significant contamination of the pump oil. This entails the introduction of a quantity of air or gas at atmospheric pressure via a manually operated valve (housed in the adaptor) into the volume between the LV stage, rotor blade and the discharge valve whilst the gas ballast mixture in this volume is at a comparatively low pressure.
When the volume of gas/vapour mixture is compressed prior to expulsion, the discharge valve opens before the partial pressure of the vapour component is high enough to cause it to condense. To prevent ingress of dust and to improve silencing, the gas ballast is filtered by a polyester foam filter/silencer.

NOTE:

For remote or automatic control of gas ballast, the manual valve can be replaced by a solenoid-operated gas ballast valve. This arrangement will also provide more effective vacuum system protection if the pump is shut down with the gas ballast open.

2.4 Interstage pumping port modification (A500-50-000)

The embodiment of this modification allows the gas ballast inlet to be used as an additional pumping port by connecting it to the inlet of the low vacuum stage.

WARNING

This modification removes the gas abllast arrangement, upon embodiment any reference within these instructions to gas ballasting must be ignored.

Prolonged running with the interstage port at atmospheric conditions could result in oil starvation of the interstage bearing which could result in seizure.

If the system is pumping contaminants, with the gas ballast facility removed, a more frequent oil change is recommended.

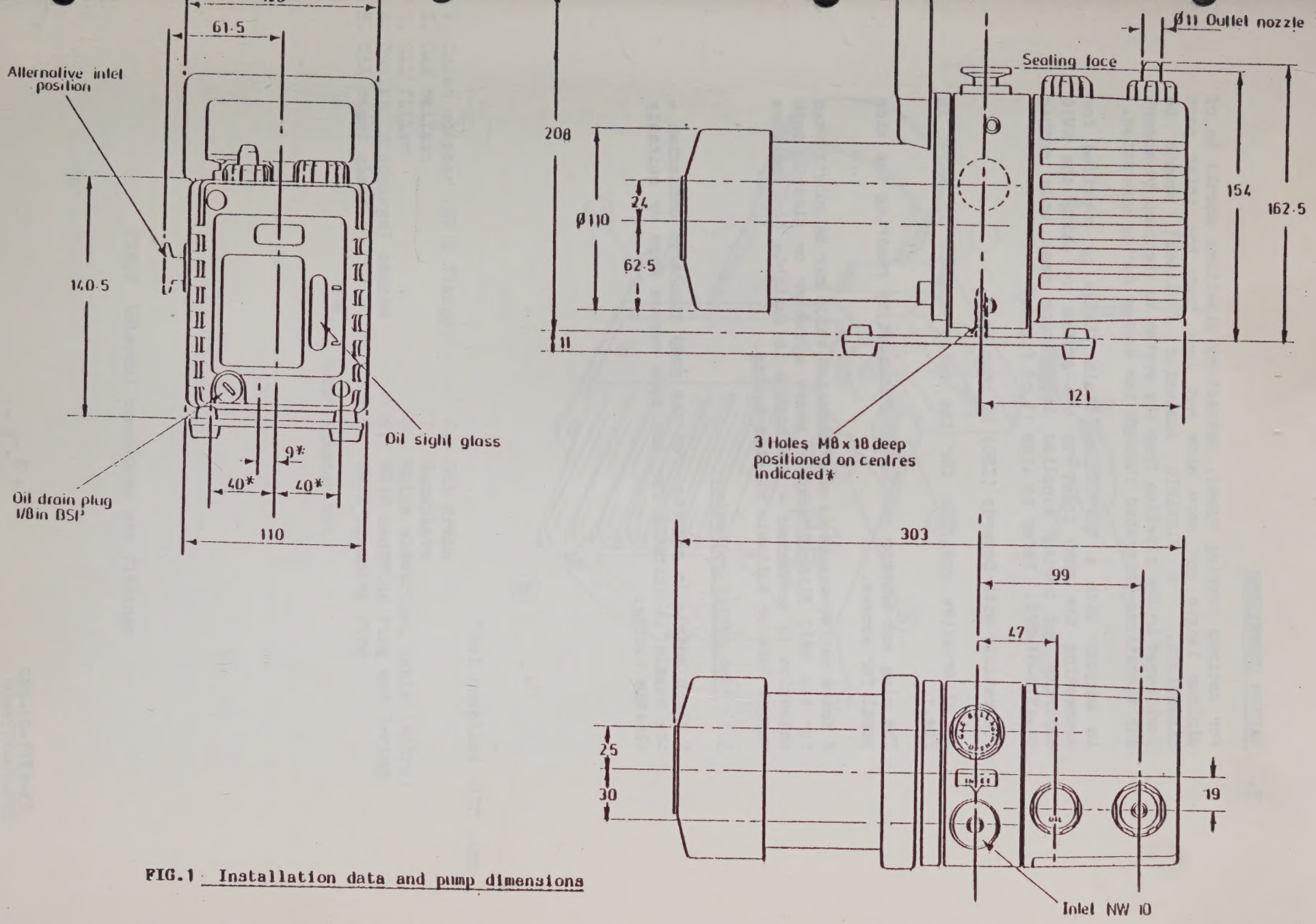


FIG.1 Installation data and pump dimensions

3. VACUUM CONNEXIONS

For optimum pumping speed, connecting pipelines should be of minimum length and bore size not less than the inlet port dimensions. A flexible connexion (bellows) should be positioned in the pipeline from the system to the pump to absorb any vibrations generated through the system during operation.

An adaptor with a *NW10 size Klein flange is provided for connecting the pump inlet to the system by using the NW10 centring and O-ring supplied in fitting pack code number 04-A371-01-026. Refer to item 11 of Fig.6.

*Compatible with Edwards (ISO) SC couplings.

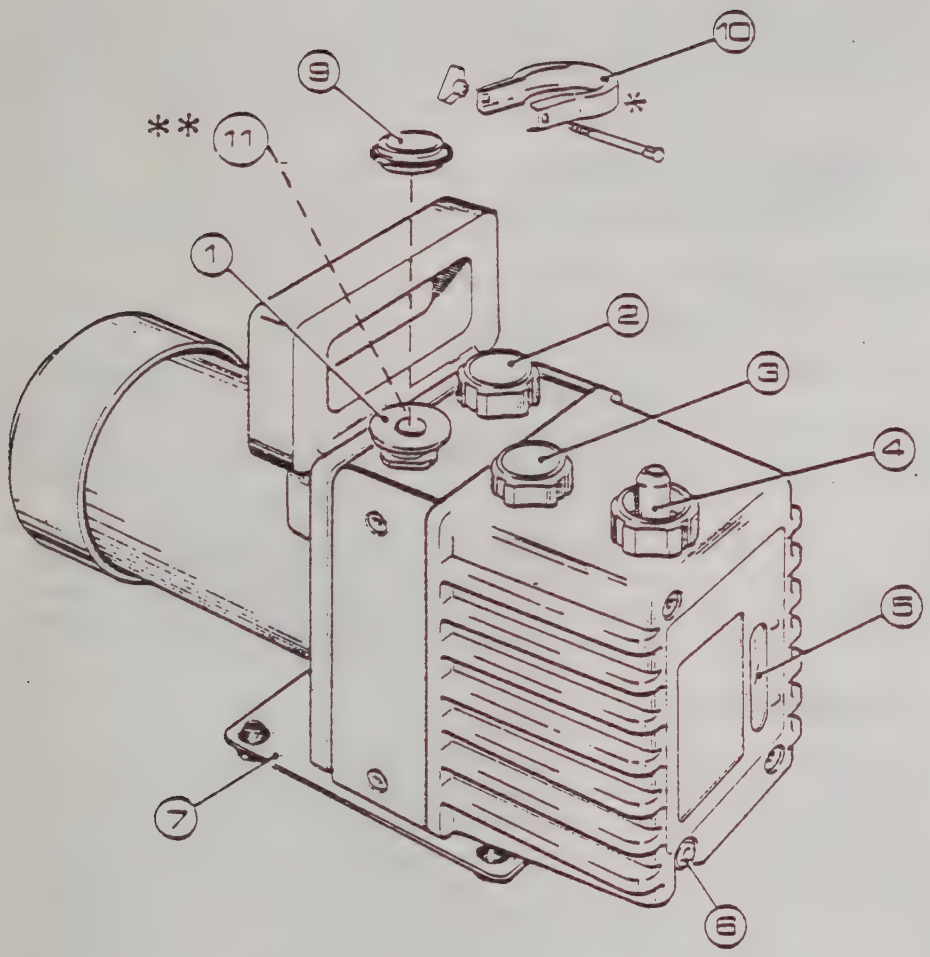
An alternative position for the inlet adaptor is shown in Fig.1.

The plug and adaptor can be interchanged by removing the side panel for access.

A spare outlet nozzle is also supplied which may be substituted for the NW10 flanged adaptor where a rubber or plastic tube connexion is preferred - the nozzle is suitable for 9mm bore vacuum hose or suitable plastic tubing.

3.1 Pump outlet connexion

A plain nozzle is provided for the pump discharge connexion - the nozzle is suitable for 9mm bore vacuum hose or suitable plastic tubing.



*Not supplied with pump

1. Inlet adaptor (NW10 flange)
2. Gas ballast
3. Oil filler
4. Outlet (discharge) nozzle
5. Oil sight glass
6. Oil drain
7. Baseplate
8. Mains electrical cable (entry)
9. NW10 centring ring and O-ring
*10. NW10 clamping ring

**11. NW25 adaptor kit

FIG.2 External connexions and fittings

4. OPERATING INFORMATION

WARNING

Ensure the pump outlet is not obstructed. This will cause a very dangerous internal pressure build up resulting in blown seals and bursting of the oil box which could cause physical injury.

4.1 Direction of rotation

Clockwise as viewed from the cooling fan end of the motor.

CAUTION: Incorrect rotation can cause dangerous internal pressure build-up.

4.2 Start up

Before starting the pump, check that the oil level is visible in the sight glass and above the 'MIN' level. The pump will operate satisfactorily at this level during normal use.

When starting up a new pump or if the pump has not been run for a considerable period - check that the oil level in the sightglass drops slightly (3 to 5 mm) after start up; this drop is indicative that the pump has been primed with oil.

4.3 Ultimate vacuum

When measuring ultimate vacuum, it should be noted that the pump oil may have a vapour pressure which is higher than that of the permanent gases in the evacuated system. Gauges of the Pirani type measure the total pressure of permanent gases and vapours and will register differently from gauges of the McLeod type which will only indicate the pressure of the permanent gases. To achieve highest vacuum when the pump has been filled with fresh oil, it is recommended that the pump is run on full gas ballast for about 30 minutes. This has the effect of purging the oil and improves ultimate vacuum.

The pump is of rugged construction, designed for long term, trouble-free service, provided the recommended operting and servicing procedure is adhered to. Before despatch, each pump is inspected and tested for performance. Many cases of suspected failure or poor pump performance are in fact due to leakage in the vacuum system, faulty gauges or unsuspected contamination of the pump oil. Any such possibilities should be rigorously investigated and rectified.

4.4 Shut down

If the pump is operating on gas ballast and is shut down for any reason, the system vacuum will not be maintained. Hence, for greater system security, it is recommended that a solenoid operated gas ballast valve (EBV20) is fitted in place of the gas ballast filter. Alternatively, for complete system isolation. a PV10EK solenoid operated pipeline valve can be fitted in the pump inlet line.

5. MAINTENANCE

All bracketted figures in Section 5 refer to Fig.5.

The periodic maintenance requirements listed in Table 1 are recommended to promote long-term service life and trouble-free operation of the pump. The maintenance frequencies specified are intended as a guide to the operator and may be suitably adjusted as determined by service experience.

The maintenance procedures include fitting of replacement parts obtainable in seals kit code number 14-A371-01-820.

TABLE 1 - MAINTENANCE SCHEDULE

	FREQUENCY	REQUIREMENT	PROCEDURE
1.	Daily	Check oil level	Refer 5.1.1
2.	After initial 100 hours running then every 6 months and after major overhaul.	*Oil change	Refer 5.1 and 5.1.1.
3.	As for 1	Clean internal oil filter. Frequency items 4 and 5 can be carried out during this requirement.	Refer 5.2
4.	Every 12 months	Examine discharge valve and spring. Renew if required.	Refer 5.3
5.	Every 12 months	Examine oil distributor rubber seal. Renew if required.	Refer 5.4
6.	Every 12 months	**Check drive member oil seals for leaks	Refer 5.5

*NOTE 1: More frequent oil changing will be necessary if the pump is used in contaminated or 'dirty systems'. The oil should be visually checked periodically for discolouration by viewing in the sightglass - the oil should be clear and transparent.

**NOTE 2: If the seals are defective, oil seepage will be visible from the bottom of the access panel (inlet side) or from the base of the motor mounting plate.

5.1 Oil changing

It is recommended to run the pump for about 15 minutes to warm the oil for ease of draining. An extension tube for the oil drain is supplied in support pack number 04-A500-02-000. Proceed to drain the oil (after warm up) by unscrewing the drain plug (23) in the bottom of the oil box and allowing the oil to drain out completely into a suitable receptacle. If the oil is dirty or contaminated, it is highly recommended that the pump is thoroughly flushed through with clean oil prior to re-filling. A filler plug (46) is provided on the top of the oil box (12).

5.1.1 Oil filling

Remove the oil filler plug (46) and fill the pump to a level which is visible within the sight glass range and above the 'MINIMUM' oil level. Use the recommended grade of Edwards oil. Replace the oil filler plug after examining the O-ring seal (88) for deterioration - renew if necessary.

NOTE 1: During normal operation the oil level must always be visible in the sightglass.

NOTE 2: It is recommended that the inlet strainer (3), positioned in the inlet port, is removed and cleaned at each oil change. Clean the strainer by washing it in a suitable cleaning agent. The opportunity should also be taken to examine the condition of any external filters or traps.

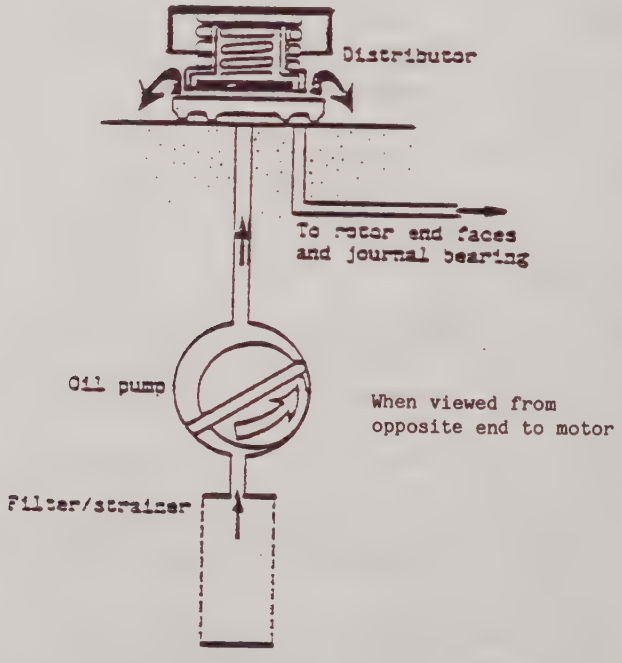


FIG.3 Oil system (schematic)

5.2 Internal oil filter cleaning

It will be necessary to remove the oil box (12) to gain access to the filter (4) which is positioned underneath the stator (9).

1. Disconnect the system and motor electrical connexions.

2. Remove the retaining screws then detach the oil box (after draining).

3. Carefully ease the filter towards the adaptor (11) and withdraw the filter (4) and its spring (68).

4. Wash the filter in a suitable cleaning agent and re-assemble.

5.3 Discharge valve renewal

This is carried out with the oil box removed and the pump disconnectged as per 5.2.

1. Remove retaining screws (95) and detach oil box baffle (52).

2. Remove retaining screws (94) and detach baffle assembly (6).

3. Remove the valve pad (62) and spring (66) and inspect for damage or ieterioration; also for wear on the seating face of the valve pad.

4. Renew pad or spring, as necessary, prior to re-assembly.

5. Re-assemble components in reverse of above.

5.4 Oil distributor valve renewal

This is carried out with oil box removal and the pump motor disconnected as per 5.2.

1. Remove the retaining screws (95) and detach the oil box baffle (52) distributor housing (16), spring (68), distributor weight (17) and spring (66).

2. Remove the seal plate (54) and the distributor valve (63).

3. Examine the valve for damage, wear or deterioration - renew as necessary.

4. Re-assemble components in reverse sequence.

5.5 Drive end oil seals renewal

This is carried out with oil box removed and the pump motor disconnected as per 5.2.

1. Remove handle (40) and baseplate (39).

2. Remove the screws (99) retaining the motor plate to the pump adaptor (11) then carefully slide the motor assembly rearwards to clear the oil seals (83).

3. Carefully prise out the front (outer) oil seal. Clean the drive member thoroughly and remove any light scores. Fit replacement seal (available in seals kit code number 14-A371-01-820). Re-assemble components in reverse order.

NOTE: If the inner seal is undamaged, do not replace. If it is defective then proceed as follows:-

1. Remove the three (long) retaining screws (97) and detach the pump cartridge from the adaptor.

2. Remove the front bearing plate (13) and sealing ring (90).

3. The inner oil seal (83) will now be exposed and can be prised out.

4. Fit replacement seal as in 5.5.3.

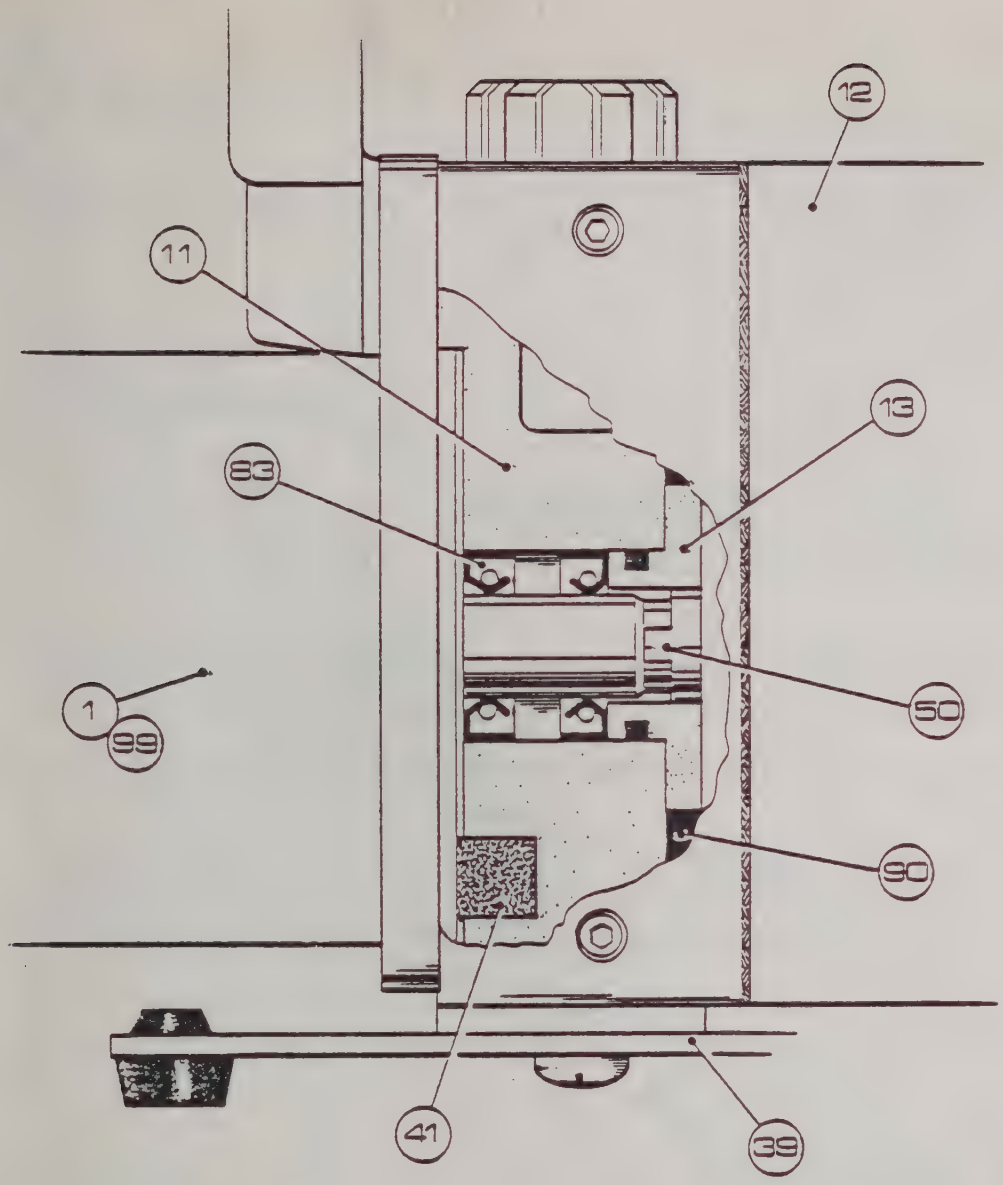
5. Re-assemble items in reverse order.

CAUTION (upon re-assembly of seals).

1. Locate front bearing plate (13) on pin (91).

2. Ensure drive member (50) is in position.

3. Exercise care during assembly to avoid damaging seals or sealing rings.



LEGEND

1.	Motor	41.	Felt pad
11.	Adaptor	50.	Drive member
12.	Oil box	83.	Oil seal
13.	Front bearing plate	90.	O-ring
39.	Baseplate	99.	Motor attachment screws

FIG.4 Assembly of drive end oil seals

FIG.5 E2M1.5 rotary vacuum pump

Item No.	Code No.	Description	Quantity
1	A07105012	Motor (220/240V)	1
2	A37101016	Relief valve assembly	1
3	A22305045	Inlet filter assembly	1
4	A22305047	Oil filter assembly	1
5	-	-	-
6	A37101020	Exhaust baffle assembly	1
7	-	-	-
8	-	-	-
9	A37101019	Stator	1
10	A37101002	End cover	1
11	A37101023	Adaptor	1
12	A37101004	Oil box	1
13	A37101005	Front bearing plate	1
14	A37101006	Rear bearing plate	1
15	A37101007	Oil pump drive shaft	1
16	A37101008	Distributor housing	1
17	A37101009	Distributor weight	1
18	A37101010	Ballast tube	1
19	A37101012	End plate	1
20	-	-	-
21	A37101017	Side panel	2
22	A37101021	Nylon rivet	4
23	A00714012	Plug 1/8in. B.S.P.	1
24	-	-	-
25	-	-	-
26	A20001087	Mains lead cable	1
27	A20001084	Hazard label	1
28	A20001090	Label	1
29	E20001063	Hazard label (electrical)	1
30	A20402150	Blade	4
31	A20402147	Oil pump blade	1
32	-	-	-
33	A20405012	Inner ring	1
34	A20414003	Steel ball	1
35*	A37101028	Adapter kit (NW25)	1
36*	A00906048	Oil drain extention kit	1
37	A21001020	Baseboard	1
38	-	-	-
39	A20499024	Baseplate	1
40	A25908025	Handle	1
41	A22302019	Felt pad	1
42	-	-	-
43	A37101022	Plug	1
44	A25907202	Ballast filter	1
45	A25908054	Ballast knob	1
46	A25908047	Filler plug	1
47	A25908048	Nozzle	1
48	A25908049	Ballast insert	1
49	A25908050	Oil filler insert	1
50	A25908051	Drive member	2
51	-	-	-
52	A25916004	Oil box baffle	1
53	-	-	-

Item No.	Code No.	Description	Quantity
54	A25970057	Distributor plate	1
55	-	-	-
56	A26002013	Plug 3/8in BSP	1
57	-	-	-
58	A26401059	High vacuum rotor	1
59	A26401060	Low vacuum rotor	1
60	-	-	-
61	A26501024	Foot	4
62	A26501036	Valve pad	1
63	A26501035	Distributor valve	1
64	A25906600	Gas ballast valve	1
65	A27102021	Spring	1
66	A27102016	Spring	2
67	A27102034	Spring	1
68	A27102036	Spring	2
69	A27102010	Spring	1
70*	A24801410	Vibration isolator kit	1
71	A27159637	Oil box gasket	1
72	-	-	-
73	A29201003	Sightglass	1
74	H02104012	Seal	1
75	H03517004	Plug 1/8in BSP	1
76	-	-	-
77	C10501061	Inlet adaptor (KF10)	1
78	-	-	-
79	-	-	-
80	-	-	-
81	H02104001	Seal	1
82	218980209	Washer M6	2
83	H02109078	Oil seal	2
84	H02109079	Oil seal	1
85	218061370	Screw M6 x 16	2
86	H02126116	O-ring	2
87	H02120034	O-ring	1
88	H02120042	O-ring	4
89	H02120065	O-ring	1
90	H02120118	O-ring	2
91	211174033	Pin	2
92	218042411	Screw M8 x 20	2
93	218062328	Screw M5 x 10	3
94	218091327	Screw M5 x 10	3
95	218091331	Screw M5 x 20	2
96	218091332	Screw M5 x 25	1
97	218091344	Screw M5 x 90	5
98	218091411	Screw M8 x 20	2
99	218091412	Screw M8 x 25	2
100	218982708	Washer M5	2
101	218121328	Screw M5 x 10	4

*Not supplied with pump

6. PUMP AND SYSTEM PROTECTION

6.1 Removal of condensable vapours

When a high quantity of condensable vapours are present in the system, gas ballast must be introduced into the pump by rotating the gas ballast valve anti-clockwise; the valve should be opened fully.

Before pumping vapours, the pump should be isolated from the system and allowed to run for approximately 30 minutes to warm the oil which will assist in preventing vapour condensation in a cold pump.

Where there is a possibility of vapours condensing in the vacuum line and could subsequently be carried to the pump, an inlet catchpot should be used.

Where water vapour is positively present and a rapid pump down to low partial pressure is required, an inlet dessicant trap is recommended.

6.2 Chemically aggressive vapours and hazardous substances

For pumps that are used in systems which evolve vapours or gases of a chemically aggressive or corrosive nature, the gas ballast flow may not completely protect the pump. In these conditions the use of a chemical inlet trap or a chemically inert pump oil is advisable. When pumping oil-soluble vapours, some contamination of the pump oil is inevitable. This can be reduced by increasing the pump temperature by heat insulation of the pump casing or by increasing the amount of gas ballast. High temperature assists in purging the oil at the end of the pumping duty.

After pumping large quantities of vapour, it is recommended that the pump is isolated from the system and run for at least 30 minutes with maximum gas ballast flow. This method particularly applies after corrosive or oil soluble vapours have been pumped. During any pause in actual pumping duty, the pump can be advantageously employed in purging the oil by this method.

6.3 Sodium azides

Pumps which are constructed of materials suitable for pumping sodium azides are denoted by the suffix "AZ" added to the model number e.g. E2M1.5AZ.

6.4 Ingress of dust

To protect the pump from ingestion of any solid particles from the vacuum system, inlet filters must be installed.

6.5 Hermetically sealed pump

This particular model of the E2M1.5 has been specifically designed for pumping very pure and/or precious gases. Further information about this type of pump may be obtained from Edwards High Vacuum.

7. ENVIROMENTAL PROTECTION

When pump down from high pressure is frequent or prolonged or when gas ballast is used, a mist filter* is recommended to eliminate pump oil mist discharge and avoid environmental pollution.

Alternatively, the exhaust outlet may be piped to discharge externally. Such an arrangement will require a sump (catchpot) and drain point so positioned as to prevent any fluids that condense in the pipe from running back into the pump therefore causing serious contamination.

***CAUTION**

The mist filter will not provide protection against discharge of toxic substances evolved in the system being pumped. Suitable exhaust arrangements should be made for protection against this hazard.

8. LUBRICANTS

8.1 Chemically resistant lubricants for pumping oxygen

When oxygen is to be pumped, a chemically inert and stable pump oil must be used. Oils of this category can also be used advantageously where chemically aggressive gases and vapours may enter the pump.

Suitable members of the range of synthetic oils known as 'FOMBLINS' have excellent properties for these applications.

8.2 Fomblin oils

Fomblin oils are fully flourinated perfluoropolyethers and are non-toxic, practically inert chemically and have no flash point or fire point. Further information on Fomblin fluids is available in Edwards publication 03-H305-51-895.

8.3 Standard and low temperature lubricants

Edwards No.15 or 17 oil is recommended for all pumping duties. These are straight mineral oils and although having similar viscosities No.17 is blended with multi-functional additives to give maximum protection against corrosion and is useful where corrosive gases or vapours may be encountered. No.17 should not be used where external chemical filtration is fitted.

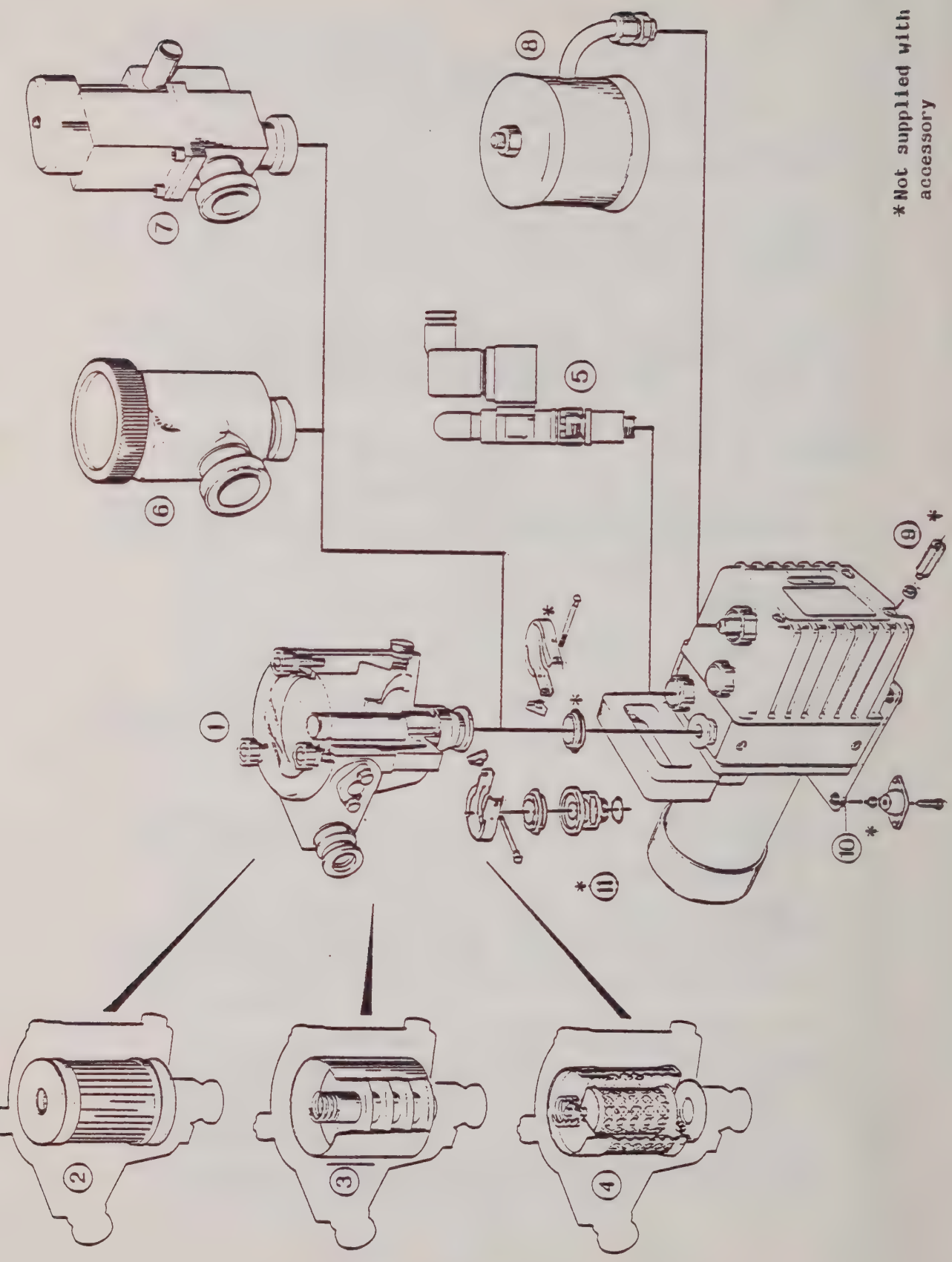


FIG.6 Accessories

9. PRODUCT DESCRIPTION - SPARES - ACCESSORIES

9.1 Product description

	Ordering number
E2M1.5 pump 220/240V single phase 50/60Hz	03-A371-01-930
E2M1.5 pump 105/115V single phase 50/60Hz	03-A371-01-988
Motor code (220/240V)	A07105012
Motor code (110V)	A07105015

9.2 Spares

Maintenance kit comprising:-	
Blades, springs, seals, gaskets, filters and washers	14-A371-01-800
Seals kit	14-A371-01-820

NOTE:

1. The 2 stage maintenance kits are also suitable for Fomblin filled pumps.
2. The seals kits are also suitable for fomblin filled pumps.

No.15 oil 1 litre	09-H110-02-015
No.17 oil 1 litre	09-H110-04-015
Klein flange:-	
NW10 O-ring and centring ring (pack of 5)	08-C105-14-495
NW10 O-ring (pack of 5)	08-H021-24-035

9.3 Accessories

Adaptor kit (INLET)	04-C105-01-608
3/8in BSP to KF25 comprising:	
KF25 clamp	08-C105-12-401
KF25 NIT O-ring	08-H021-24-015
KF25 centring ring	08-C105-14-496
O-ring for 3/8in BSP	08-H021-05-010

Edwards offer a fully comprehensive range of accessories for the E2M1.5 rotary vacuum pump. Illustrated in Fig.6 and listed as follows:-

Fig.6 Item	Model	Description	Ordering number
1.	ITO20K	Inlet catchpot - to trap liquid droplets - prevents moisture from the gas loads reaching the pump. Adaptor kit required	04-A441-10-000
2.	ITF20K	Inlet dust filter - to protect the pump against abrasive dust. Incorporates a nylon filter element. Used where there is moderate dust concentration. Adaptor kit required	04-A442-15-000
3.	ITD20K	Inlet dessicant trap - designed for use on systems where the requirement is for removal of limited quantities of moisture to low vapour pressures. The phosphorous pentoxide (P_2O_5) desiccant is contained in a four-tier tray assembly. Adaptor kit required	04-A445-10-000

Fig.6 Item	Model	Description	Ordering number
4.	ITC20K	Inlet chemical trap - to protect against chemically active gases - incorporates a basket to contain trapping material appropriate to the duty; e.g. activated charcoal to trap heavy vapours etc. Adaptor kit required	04-A444-10-000
5.	EBV20	Solenoid operated gas ballast control valve - for remote or automatic on/off control of gas ballast - can be connected so as to shut-off ballast when the pump is switched off; to prevent air returning to the system. Direct fitting except when used with ITO-ITF, ITD, ITC20 inlet filters, when a ¼in BSF M/F elbow is required.	20-A500-06-930 (220/240V, 1ph, 50/60Hz) 20-A500-06-984 (100/120V, 1ph, 50/60Hz)
		Adaptor elbow	14-H035-18-141
6.	FL20K	Foreline trap - for use on clean pumping systems - utilises the trapping properties for oil vapour of activated alumina to prevent back migration of rotary pump oil vapour into the vacuum system. Adaptor kit required	04-A133-05-000
7.	PV10EK	Solenoid operated pipeline valve - for direct connexion to pump inlet to provide complete system protection if the pump is switched off with the gas ballast valve open.	08-C311-07-000 (200/240V, 1ph. 50/60Hz) 08-C311-08-000 (110/127V, 1ph. 50/60Hz)
8.	OMF2	Outlet mist filter - can be utilised to capture oil mist which would otherwise be emitted to the environment with effluent gas, either when gas ballasting or when pumping high gas throughputs.	04-A131-06-000
9.	-	Oil drain extension - provides oil box draining facility to existing drain port, addition of further extensions can facilitate any length requirements.	04-A500-02-000

Fig.6 Item	Model	Description	Ordering number
10.	-	Vibration isolators - rubber pedestal type mountings for pumps installed in frame structure - to reduce transmission of noise and relieve stresses due to misalignment of mounting points on structure.	04-A248-01-410 (Set of 4)
11.	-	NW25 adaptor kit - provides fitting facility for items 1-2-3-4-6 inclusive which have NW25 flanges.	04-A371-01-028
-	-	NW10 flexible bellows - made of stainless steel. For installation in the pipeline from the pump to the system - recommended if anti-vibration mounts are utilised.	08-C105-11-670

10. COMMUNICATION WITH EDWARDS

Any communication relating to the subject of this instruction should be addressed to Edwards High Vacuum International or to the supplier from whom it was purchased.

Please specify:

1) the model, serial number and code.

2) the date of purchase.

3) your order number and the suppliers sales reference.

Equipment MUST NOT be returned to the supplier without prior arrangement.

IMPORTANT Health and Safety

Under Section 3 of the Health and Safety at Work Etc Act 1974 every employer has a duty to conduct his business so as not to expose persons not in his employment to risks to their health and safety. When goods are returned to the supplier, therefore, warning must be given if their usage is likely to render the equipment hazardous in any way. Your attention is drawn to FORM HSC001 attached.

Edwards High Vacuum International and its distributors reserve the right to refuse acceptance of any equipment returned which they have reason to believe may be hazardous.

Damage in transit

If any damage has occurred in transit, it is important to inform both the carrier and the supplier within three days of delivery.

Edwards SERVICE

Edwards High Vacuum
(Part of The BOC Group plc)
W. Sussex RH10 2LW
Tel: 0293 28844
Telex: 87123 edivac g

PROCEDURE FOR RETURNING CONTAMINATED PUMPS TO EDWARDS HIGH VACUUM OR EDWARDS HIGH VACUUM DISTRIBUTOR

When returning a pump to EHV, the following procedure should be followed:

All fluid **must** be drained prior to despatching the pumps.

All pump outlets must be sealed with suitable blanking covers or PVC tape.

All accessories should be removed and if they require servicing, sealed in heavy-duty polythene bags and secured to the pallet with the pump.

Inlet and outer mist filters should be removed. All filter elements **must** be removed and disposed of as contaminated waste.

Any openings left by removing accessories must be sealed with suitable covers or PVC tape.

Pumps and accessories must be sealed in a heavy duty polythene bag and securely strapped to a suitable pallet *(the dimensions of which should not exceed 510mm by 915mm).*

The pallet must be labelled in accordance with current Packaging and Labelling Dangerous Substances regulations 1978 (SI No. 209) and subsequent amendments. At the present time (1985) the following labels should be used:

MAY CONTAIN TOXIC OR CORROSIVE CHEMICALS

8. The Service Department at EHV or EHV Distributor must be notified in writing of the nature of the hazard, the name of the carrier and anticipated delivery date, using Form HSC 001. This should be either Faxed *(Fax No. 0293 33453)* or sent by 1st class post to ensure that we have this information before we receive the equipment.
9. A copy of form HSC 001 should be handed to the carrier who must be informed that the cargo may be contaminated and who should present this copy of HSC 001 with the delivery note at EHV.
10. It is recommended that such pumps should only be transported in vehicles where the driver is in a separate cab, *eg open back lorry.*
11. Failure to comply with this procedure will lead to delays in servicing the equipment.

Edwards SERVICE

Edwards High Vacuum
(Part of The BOC Group plc)
W. Sussex RH10 2LW
Tel: 0293 28844
Telex: 87123 edivac g

HEALTH AND SAFETY CLEARANCE FORM HSC 001

.0 This form must be used when returning pumps and equipment for service at EHV or EHV distributor as per EHV procedure.

2.0 A completed copy of this form should be Faxed *(Fax No. 0293 33453)* or sent by 1st class post to ensure that we have this information before we receive the equipment.

A further copy should be handed to the carrier with the equipment.

3.0 Failure to complete the form or comply with the procedure will lead to delays in servicing the equipment.

4.0 Please complete the following sections:

4.1 Pump/Equipment Type .....

4.2 Serial No. .....

4.3.0 Details of all substances pumped.

4.3.1 Chemical names:

(a) .....

(b) .....

(c) .....

(d) .....

4.3.2 Precautions to be taken in handling of these substances:

(a) .....

(b) .....

(c) .....

(d) .....

4.3 Action to be taken in the event of human contact or spillage:

(a) .....

(b) .....

(c) .....

(d) .....

4.4 Any further information which you consider relevant:

4.5 Please complete section 4.5.1 if substances are not toxic or hazardous or 4.5.2 if they are.

4.5.1 I hereby confirm that the equipment specified above has **not** pumped or come into contact with any toxic or hazardous substances and that the equipment has been drained of lubricant.

Signed: .....

Name: .....

Position .....

For and on behalf of: .....

Date .....

4.5.2 I hereby confirm that the only toxic or hazardous substances that the equipment specified above has pumped or been in contact with are named above, that the information given is correct and that the following actions have been taken:

1. The equipment has been drained of lubricant.
2. The inlet/outlet ports have been sealed and the equipment has been securely packed and labelled in accordance with EHV procedure.
3. The carrier has been informed of the hazardous nature of the consignment.

Signed: .....

Name: .....

Position: .....

For and on behalf of: .....

Date: .....

4.6 Carrier to be used: .....

Delivery date to EHV: .....

IMPORTANT

Before returning any product for service this form must be completed and sent to the Edwards company or official distributor undertaking the service.

Edwards

International Sales and Service

United Kingdom
Edwards High Vacuum International
Manor Royal, Crawley
West Sussex RH10 2LW
Tel. (National) Crawley (0293) 28844
(International) +44 293 28844
Telex 87123 EDIVAC G
Fax 0293 33453

Edwards High Vacuum is
part of The BOC Group plc

Brazil
Edwards Alto Vacuo
(Division of BOC do Brasil Ltda.)
Rua Bernard Wrona 222
02710 – São Paulo-SP
Telephone 858-0377
Telex 1130772 EDRS BR

Canada
Edwards High Vacuum
(Part of Canadian Oxygen Ltd)
430 South Service Road West
Oakville, Ontario L6K 2H4
Telephone 416 845 3437/416 364 2085
Telex 06982429 COL MSGA

Italy
Edwards Alto Vuoto SpA
20090 Trezzano s/n (Milano)
Via Carpaccio, 35
Telephone 445 38 51
Telex 311345 EDVAC I
Fax 39-2-4458037

Japan
Nissan Edwards Shinku KK
12-15 Shimomaruko 2-chome,
Ota-Ku, Tokyo 146
Telephone 03 756 4026
Telex 2466404 NES J
Fax 81-3-7595434

West Germany
Edwards, Kniese & Co
Hochvakuum GmbH
Geschäftsbereich Komponenten
Postfach 1409, D-3550 Marburg
Telephone 064 21/803-0
Telex 482732 EDVAC D
Fax 064 2180388

USA
Edwards High Vacuum, Inc. (Sales only)
3279 Grand Island Boulevard
Grand Island, New York 14072
Telephone 716 773 7552
Toll free 800 828 6691
New York State 800 462 2550
Telex 6854319 EDHIVAC
Fax 1-716-7733864

Edwards High Vacuum, Inc. (Service only)
2175 Military Road
Tonawanda, New York 14150
Telephone 716-695-6354
Telex 6854319 EDHIVAC

Edwards High Vacuum, Inc.
155-c New Boston Street
Woburn, Massachusetts U1801
Telephone 617 938 1258

Edwards High Vacuum, Inc.
2204 Forbes Drive
Austin, Texas 78754
Telephone 512 834 8833

Edwards High Vacuum, Inc.
374 South Milpitas Blvd.
Milpitas, California 95035
Telephone 408 946 4707

Plus a network of sales and
technical information centers
across the nation.

Edwards and the striped symbol
are BOC Group trade marks

1986

Distributors worldwide

©Printed in England

MP MASTER
MA35379